



## **Macroalgae and Eelgrass Study for Proposed Subtidal Lease**

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November 5, 2019



## Background

Taylor Shellfish conducted a field study at the location of a proposed farm in Oakland Bay to document existing macroalgae and native eelgrass (*Zostera marina*) coverage and conditions within the project area. The survey site is in the northern portion of Oakland Bay and near Chapman's Cove. The proposed lease is approximately 1000 by 3200 feet. The project location is shown in Figure 1.

Survey protocols are based on guidance from WDFW's Eelgrass/Macroalgae Habitat Interim Survey Guidelines (Rev. 06/16/2008) as well as the Army Corps of Engineers Components of a Complete Eelgrass Delineation and Characterization Report (May 27, 2016).

Eelgrass and macroalgae resources have not been identified within the project area by Washington State agencies in their reviews. The Washington Department of Natural Resources captures eelgrass data in Puget Sound through their Puget Sound Seagrass Monitoring program. They have not identified any eelgrass resources within the project area. In addition, the Washington Department of Fish and Wildlife shares data on priority habitats in Puget Sound. Neither agency has existing data on native eelgrass presence or significant macroalgae resources within the project area.

## Survey Protocol

The survey was conducted to identify the presence and distribution of macroalgae and native eelgrass between September 10<sup>th</sup> through September 20<sup>th</sup> 2019. The survey was conducted within the potential lease boundaries with a surface area totaling approximately 73 acres (Figure 2). The survey was conducted by boat towing an underwater camera to survey the bottomlands. Attached macroalgae were noted and relative densities recorded.

The boat surveyed the property along transects oriented parallel and perpendicular to the shoreline. Transects were primarily located in a North – South direction with approximate 50 foot spacing due to predominant wind and tidal influence. Some transects occurred in an East - West direction per Washington Department of Fish and Wildlife (2008) and Army Corps of Engineers guidance (2016). Spacing was maintained using a GIS baselayer on GPS units used during the survey (Figure 3).

The boat towed an Aqua-Vu camera on a rope with a 10-pound weight to ensure that the camera remained slightly above the bottom throughout the survey. Video footage was recorded and is digitally submitted with this report. Video footage was observed in real-time and reviewed after the fact to ensure that any instances of submerged aquatic vegetation were captured. All video imagery was recorded and is available with this survey. Precise GPS coordinates of transect lines were recorded in real-time using a Trimble Geoexplorer 6000 series GPS unit and ArcGIS Collector for iPhone with GPS tracking. Transects are visible in Figure 3. Note: Transects 15-17 do not have boat tracks on the map. They were surveyed and video footage has been reviewed and is available with this report. However, there was a malfunction with the GPS unit while these transects were being completed.

Substrate type and features were reviewed after the survey using VLC media player. Substrate type as well as substrate features, macrofauna, and macroalgae are noted in Table 1. Video stills were taken of all key habitat features at the site and are available in Appendix A.

## Oakland Bay Submerged Aquatic Vegetation Survey

Depth of the four corners as well as the beginning and ending of transects were recorded and noted on Table 2. Depth was recorded using a Garmin GPSmap 441s equipped with a depth sounder. Figure 4 indicates the depth of the four corners of the project area.

ArcGIS Desktop was used to generate aerial maps of the project area. Transects were precisely mapped and the coordinates are available upon request so that the transects can be precisely relocated in the future. Video stills were taken of all key habitat features at the site and are available in Appendix A.

Video files are available for review. Table 3 indicates the location of files for each transect. It is recommended to use a media player such as VLC Media Player to review files.

### Environmental Conditions

The proposed farm site was surveyed at bottom elevations ranging from 5.6 to 10.4 feet deep (Mean Lower Low Water).<sup>1</sup>

Sediments: Substrate throughout the survey was uniform and consisted of a mixed fine/clay/mud habitat type. Fines appeared to be the dominant grain-size in the project area with easily disturbed fines visible throughout. There were minimal instances of broken shell. There were also minimal instances of woody debris in the form of branches and logs on the substrate throughout the site.

Macroalgae: The coverage or abundance of macroalgae was very sparse with minimal plants found throughout the project site. Due to the lack of structure on the substrate, it's likely that most of the macroalgae noted in the survey was unattached as drift or broken macroalgae. There were some structural features on the substrate including tree branches and sea whips (*Stylatula elongata*) where drift macroalgae appeared to be entangled or attached. Significant macroalgae beds were not observed in this survey.

The macroalgae present in the survey consisted predominately of red and brown algae with possible *Sarcodiotheca gaudichaudi*, *Chondracanthus exasperates*, *Gigartina* spp., and *Gracilaria*. Scattered specimens of other macroalgae included the green algae sea lettuce (*Ulva* spp).

Native eelgrass (*Zostera marina*) was not present in the project area. This finding is consistent with DNR's recent findings in their Submerged Aquatic Vegetation Monitoring Program<sup>2</sup>. Still imagery of macroalgae is available in Appendix A of this report.

### Macrofauna:

Sea whips (*Stylatula elongata*) were the most dominant macrofauna found in the survey (see Table 1). Sea whips were found throughout the survey area in variety of densities throughout the site. Graceful crabs (*Cancer gracilis*) were a common species in the survey with minimal instances of kelp crabs (*Pugettia producta*) found. There are no wild geoduck tracts within the survey area according to Washington Department of Natural Resources data (2019) and geoduck was not present in the survey. Still imagery of macrofauna is available in Appendix A of this report.

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<sup>1</sup> Based on predicted, not actual tides due to a lack of data for actual tides in Oakland Bay.

<sup>2</sup> (cite [https://www.dnr.wa.gov/publications/aqr\\_nrsh\\_svmp\\_report\\_2013.pdf?hkhyxx](https://www.dnr.wa.gov/publications/aqr_nrsh_svmp_report_2013.pdf?hkhyxx))

## Oakland Bay Submerged Aquatic Vegetation Survey

### Summary

No significant macroalgae resources were found in the survey. There were limited instances of drift algae and minimal instances of attached macroalgae within the survey area. No native eelgrass was found within the project area. The substrate within the project area varied from an open sandy/muddy area with limited broken shell to three-dimensional structure with sea whips. Macroalgae species and coverage and macrofauna were consistent with a partially enclosed, deep estuarine subtidal mud habitat described by Dethier et al (1990).

## Oakland Bay Submerged Aquatic Vegetation Survey

### Works Cited

- Army Corps of Engineers (May 27, 2016). Component of a Complete Eelgrass Delineation and Characterization Report. Retrieved from <https://www.nws.usace.army.mil/Portals/27/docs/regulatory2/FormsEtc/Components%20of%20Eelgrass%20Delineation%2020180109.pdf?ver=2018-01-12-102015-010> on September 6, 2019.
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- Washington Department of Natural Resources (February 27, 2015), Puget Sound Submerged Vegetation Monitoring Program. Retrieved from [https://www.dnr.wa.gov/publications/aqr\\_nrsh\\_svmp\\_report\\_2013.pdf?hkhyxx](https://www.dnr.wa.gov/publications/aqr_nrsh_svmp_report_2013.pdf?hkhyxx))

## Appendix A: Still Imagery of Substrate Features



Figure 3c: Captured video frame from Transect 15 of another graceful crab.



Figure 3d: Captured video frame from Transect 19 of a group of graceful crabs.



Figure 3e: Captured video frame from Transect 16 of graceful crab.

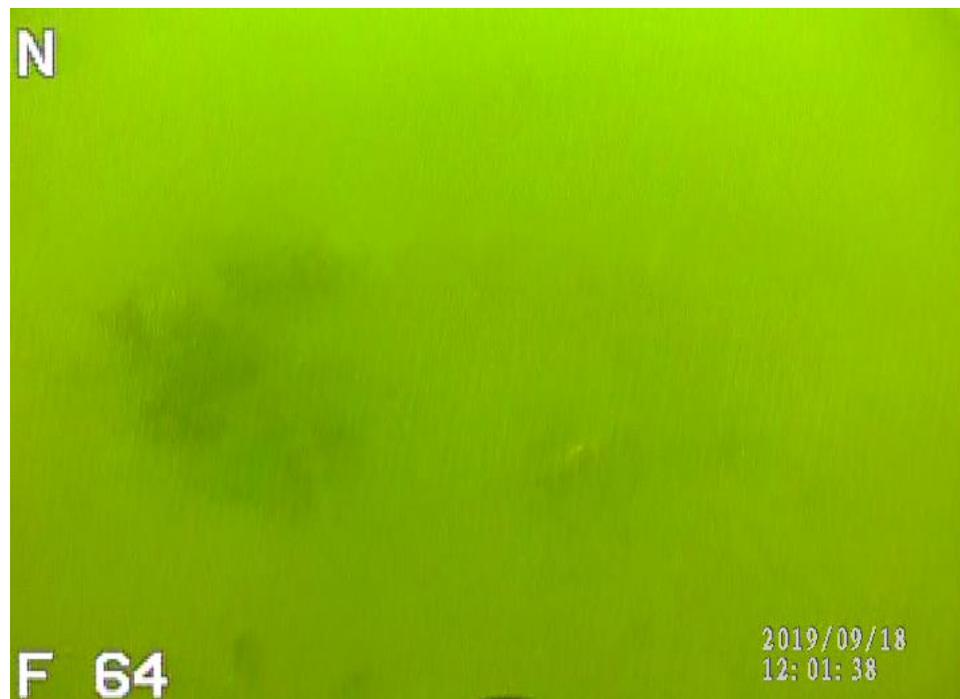


Figure 3f: Captured video frame from Transect 16 of an unidentified red/brown algae. Algae appears to be drift algae

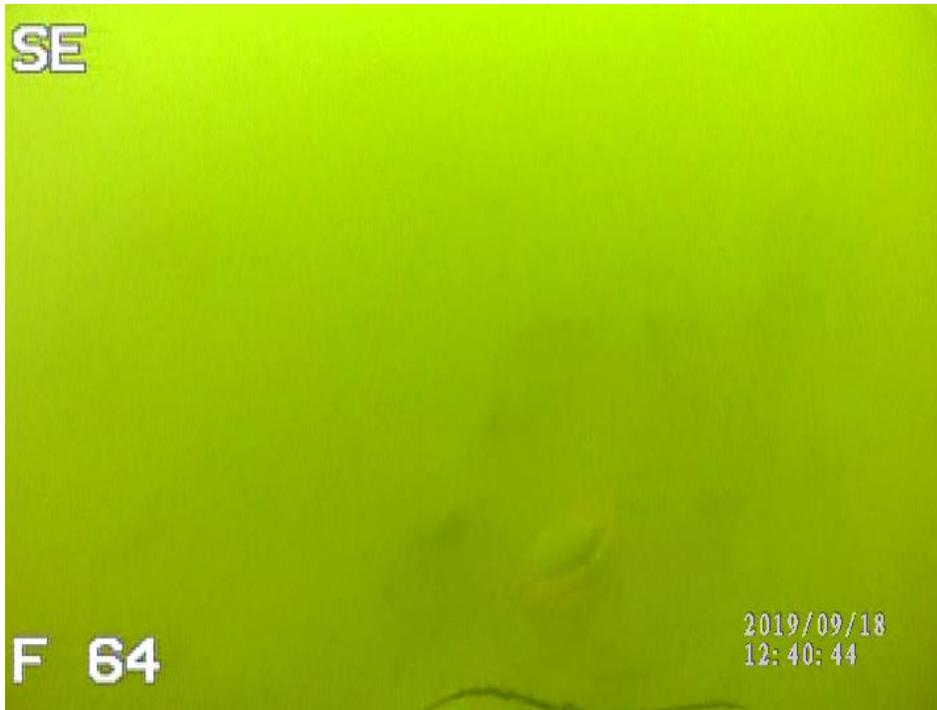


Figure 3g: Captured video frame from Transect 17 of an unidentified crab.



Figure 3h: Captured video frame from Transect 18 of sea lettuce (*Ulva* spp.).



Figure 3i: Captured video frame from Transect 18 of a red/brown macroalgae.



Figure 3j: Captured video frame from Transect 19 of sea whips (*Stylatula elongata*). Sea whips were commonly seen throughout the survey.



Figure 3k: Captured video frame from Transect 20 of an unidentified red/brown macroalgae.



Figure 3l: Captured video from Transect 19 of a kelp crab (*Pugettia producta*) attached to woody debris. The camera briefly was caught on this branch.



Figure 3m: Captured video frame from Transect 21 of sea lettuce (*Ulva* spp.).



Figure 3n: Captured video frame from Transect 26 of a red/brown macroalgae on woody debris. Algae appears to either be attached or caught on the woody debris.



Figure 3o: Captured video frame from Transect 21 of a red/brown macroalgae on woody debris. Algae appears to either be attached or caught on the woody debris.



Figure 3p: Captured video frame from Transect 20 of a red/brown macroalgae on a sea whip. Algae appears to either be attached or caught on sea whip.



Figure 3q: Captured video frame from Transect 24 of sea whip field (*Stylatula elongata*) with a broken shell visible. While sea whips were common in the survey, densities as high as this photo were rare.



Figure 3s: Captured video frame from Transect 26 of graceful crab (*Cancer gracilis*).

